

**HAPLOPEODES, A NEW GENUS FOR HAPLOMYZA OF AUTHORS
(DIPTERA, AGROMYZIDAE)**

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Abstract.—The type-species of *Haplomyza* Hendel, *Antineura togata* Melander, is shown by the structure of the male postabdomen to be referable to *Liriomyza*. A new genus *Haplopeodes*, type-species *Phytomyza minuta* Frost, is erected for a compact group of species hitherto considered closely related to the species now designated as *Liriomyza togata* (Melander). Three new species, *Haplopeodes kefi* (California, U.S.A.), *H. vogti* (Rio Grande do Sul, Brazil), and *H. eurhabdus* (Argentina) are described, and a key to the American species of *Haplopeodes* is given.

Genus *Liriomyza* Mik

Liriomyza Mik, 1894: 289. Type-species, *urophorina* Mik, by monotypy. *Antineura* Melander, 1913: 249. Type-species, *togata* Melander, by original designation. Preoccupied by *Antineura* Osten Sacken, 1881.

Haplomyza Hendel, 1914: 73. New name for *Antineura* Melander; type-species, *togata* Melander, by autotypy. NEW SYNONYM.

Haplomyza was recognized as a genus by Spencer (1963), following Frick (1959), on the basis of the following combination of characters: Orbital setulae reclinate; crossvein *in* (*tp*) lacking; pregonite bearing a well-developed seta; only one upper orbital seta present; and male genitalia of a uniform type. He further stated that two of the characters cited by Frick, viz., those of matt gray mesoscutum and presence of only two rows of acrostichal setae, do not hold for some South American species that are otherwise typical, inasmuch as those species have largely shining mesoscuta and one of them has about five rows of acrostichals.

The type-series of *Antineura togata* (see below) unfortunately does not have the characteristic male postabdominal structures which, as Spencer (1963: 373) stated, "show that they (the dark and shining South American species) can be included in a natural genus, together with the yellow and gray species such as *H. tigrensis* from Argentina, and *H. togata* (Mel.) and other North American species." The inclusion by Spencer of *H. togata* in this group can be explained by the fact that Frick (1953), on comparison of

external characters, referred parts of the original series of *Phytomyza minuta* Frost (shown below to be conspecific with the type of *minuta*) to *H. togata*, while referring to *H. minuta* only a series reared from *Chenopodium album*.

The type of *Antineura togata* has a postabdomen (Fig. 1) similar in all respects to those of many species that have been placed in *Liriomyza*. Only the characters of the acrostichal setae, color, and lack of crossvein *im* in the wing remain to distinguish it from those species of *Liriomyza*. The stridulating mechanism of male *Liriomyza* species discovered by Tschirnhaus (1972; Spencer, 1976: 223) can be distinguished in the lectotype of *togata* as a ridge on the posterior side of the hindfemur, but in a microslide preparation of a male paratype of *Haplopeodes kefi*, n.sp. neither the femoral ridge nor the abdominal file could be distinguished.

Haplomyza, therefore, must be considered a synonym of *Liriomyza*, several of the European species of which possess one or more of the characters of *togata*.

Liriomyza togata (Melander), NEW COMBINATION

Figs. 1A–1D

Antineura togata Melander, 1913: 250.

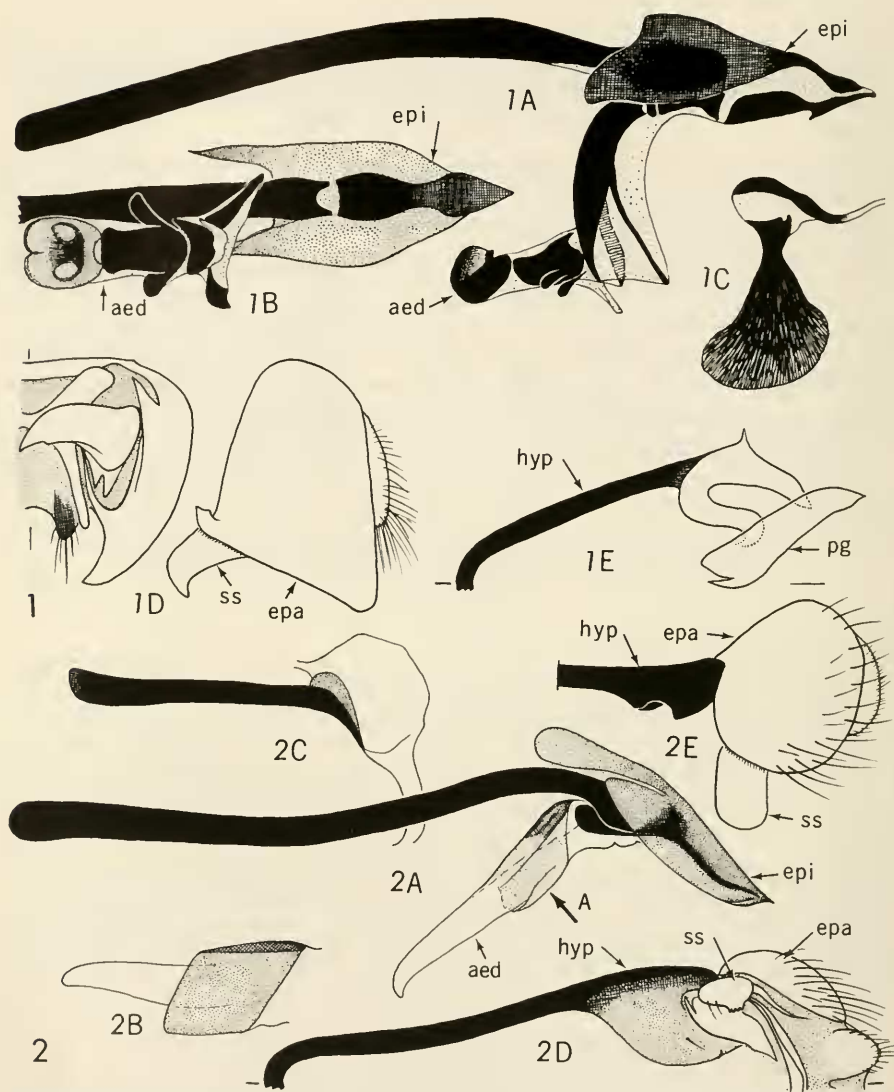
Haplomyza togata (Melander), Hendel, 1914: 73; Frick, 1952: 410; Frick, 1953: 73; Frick, 1957: 204 (lectotype selection); Frick, 1959: 413; Spencer, 1963: 373; Frick, 1965: 803.

The male specimen from Pullman, Washington, selected as lectotype by Frick, is now in the U.S. National Museum collections. Its postabdomen is shown in Fig. 1; it is in all respects similar to many species of *Liriomyza*. The only other specimen referable to *L. togata* that I have seen is the allolectotype (paralectotype) from Almota, Washington, the only other member of the original syntypic series. I cannot distinguish it from several of the species here placed in *Haplopeodes*. The food-plant of *L. togata* is not known.

Haplopeodes Steyskal, NEW GENUS

Type-species, *Phytomyza minuta* Frost. Gender masculine; derivation from Greek *haplous* 'simple' + *peos* 'penis' + *eidōs* 'form' + *ēs* adjectival derivational suffix (-ēs, masc. and fem.; -es, neuter).

This taxon corresponds essentially to the genus *Haplomyza* as used by Frick and Spencer (see foregoing), with the exception of the type-species, *Antineura togata* Melander, shown herein to be referable to *Liriomyza*. The species comprised in this concept, including *Haplomyza minuta* (Frost), most specimens of which have been erroneously identified with *Liriomyza togata* (Melander), form a compact group distinguished by a simple aede-



Figs. 1A-1E. *Liriomyza togata*. 1A. Phallosome, lateral view. 1B. Same, ventral view. 1C. Sperm pump. 1D. Epandrium and associated structures, anteroventral and profile views. 1E. Hypandrium and pregonite (sinistral half).

Figs. 2A-2E. *Haplopeodes kefi*. 2A. Phallosome, lateral view. 2B. Aedeagus in A view. 2C. Sperm pump. 2D. Epandrium, hypandrium, and associated structures less phallosome (sinistral half). 2E. Epandrium and part of hypandrium, profile. aed = aedeagus; epa = epandrium; epi = epiphallus; hyp = hypandrium; pg = pregonite; ss = surstylus.

gus lacking or almost lacking lobes or processes and with very little coloration, an elongate or scoop-shaped epiphallus, anteriorly rounded hypandrium with a seta on the lobe that bears the pregonite, a surstylus with an apical comb of two to four denticles, and a sperm-pump with a large colorless vesicle. The taxon is here considered a genus apparently closely related to *Liriomyza* and *Calycomyza*. The seta on the pregonite-bearing hypandrial lobe is yellowish and difficult to perceive; I have been unable to distinguish it in *H. vogti* and *H. eurhabdus*. The diagnostic characters of seven of the species in the following key are only in the male postabdomen, and the most distinctive parts seem to be the surstylus, epiphallus, and structures at the base of the aedeagus. I have not been able to find characters in other parts of the body to distinguish these species from each other, or indeed from *Liriomyza togata*, and the color characters cited by Frick (1959) do not seem to be trustworthy.

Species from other parts of the world than the Americas include a few from Europe that have been placed in *Haplomyza* (as a subgenus of *Liriomyza*) by Hendel (1931: 198), two Australian species that have been recently placed in *Liriomyza* (Spencer, 1977), and *Haplomyza diminuella* Spencer (1961: 339), described from a single female specimen from South Africa. *Haplopeodes* is probably restricted to the Americas.

The species of *Haplopeodes*, so far as is known, are leaf miners in a variety of plants, chiefly in the families Amaranthaceae, Chenopodiaceae, and Solanaceae. Morphological characters of immatures are known for only one species, *H. lopesi* (Oliveira and Silva, 1954).

The adult males of *Haplopeodes* may be distinguished as in the following key.

KEY TO SPECIES OF *HAPLOPEODES* BASED LARGELY UPON MALES

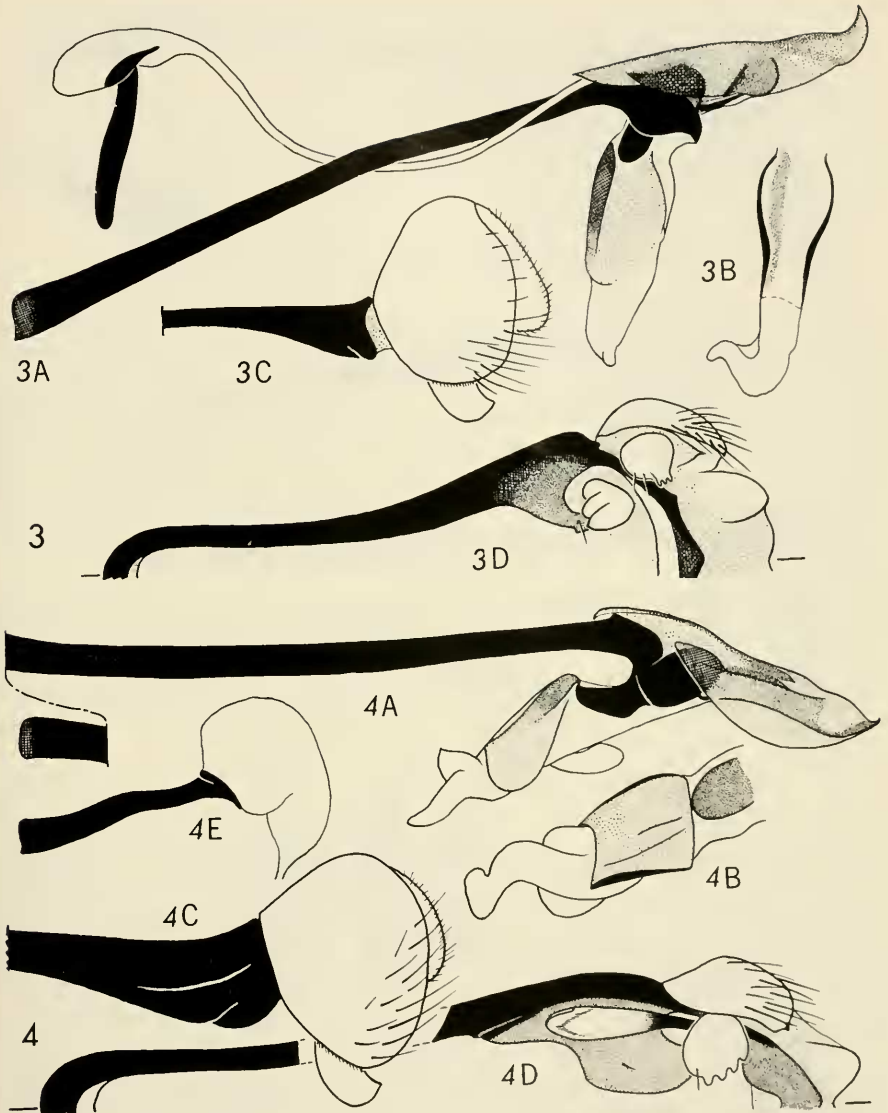
- 1 (2) Inner postalar seta arising from yellow area; scutellum so largely yellow that basal seta arises from area of that color; male unknown (miner in *Portulaca* sp.; New Mexico) *H. palliatus* (Coquillett)
- 2 (1) Inner postalar seta arising from blackish area; scutellum more extensively blackish, including area at base of basal seta.
- 3 (8) Front and scutellum dark brown to black (miners in *Solanum* spp. in Brazil).
- 4 (5) Halter entirely dark, blackish *H. bullati* (Spencer)
- 5 (4) Halter at least partly yellowish.
- 6 (7) Third antennal segment black; knob of halter gray mesally, yellow laterally; surstylus with 4 minute, widely spaced denticles *H. verbascifolii* (Spencer)

- 7 (6) Third antennal segment pale brown; knob of halter yellow; surstylus with 4 blunt teeth and 2 denticles (Fig. 7) *H. lopesi* (Oliveira and Silva)
- 8 (3) Front yellow; scutellum yellow mesally; halter yellow (species mining in *Amaranthaceae*, *Chenopodiaceae*, and *Solanaceae*).
- 9 (10) Male with complex aedeagus of *Liriomyza* type (Fig. 1) (host unknown; Washington) *Liriomyza togata* (Melander)
- 10 (9) Male with simple aedeagus (Figs. 2-6).
- 11 (14) Surstylus (Figs. 4, 9) with 3 or 4 blunt teeth occupying most of apical margin, also with 1 seta close to one of the teeth.
- 12 (13) Surstylus (Fig. 9) with 3 teeth and 1 seta; each arm of hypandrium with median expansion (Florida) . . . *H. philoxeri* (Spencer)
- 13 (12) Surstylus (Fig. 4D) with 4 teeth and 1 seta; arms of hypandrium of uniform width as far as basal lobe (Fig. 4D) (Argentina) *H. tigreensis* (Spencer)
- 14 (11) Surstylus (Figs. 2, 3, 5, 6, 7) with only 2 teeth or with 3 or 4 teeth very close together.
- 15 (18) Surstylus with 2 triangular teeth and without seta.
- 16 (17) Abdomen black centrally, sometimes broadly yellowish laterally; surstylus as in Fig. 7 (Argentina) *H. capsici* (Spencer)
- 17 (16) Abdomen yellowish with 3 pairs of blackish spots (Fig. 6F), surstylus as in Fig. 6D (Argentina) . . *H. eurhabdus*, new species
- 18 (15) Surstylus with 2 setae and 2 or more teeth or with 3 or 4 teeth and without setae.
- 19 (20) Surstylus (Fig. 5D) with 4 minute closely-spaced teeth and without seta, attached anterior to ventral apex of epandrium (Fig. 5C) (Brazil) *H. vogti*, new species
- 20 (19) Surstylus (Figs. 2D, 3D) with 2 to 4 small teeth on common projection and with 2 setae (United States).
- 21 (22) Hypandrium (Fig. 3D) with narrow basimesal seta-bearing lobe; aedeagus in posterior view (Fig. 3B) (western U.S.) *H. minutus* (Frost)
- 22 (21) Hypandrium (Fig. 2D) with broad seta-bearing lobe; aedeagus in posterior view (Fig. 2B) with basal part in form of parallelogram (California) *H. kefi*, new species

Haplopeodes bullati (Spencer), NEW COMBINATION

Haplomyza bullati Spencer, 1963: 374.

This species is known only from a single pair in Spencer's collection, reared from leaves of *Solanum bullatum* Vell. in the State of São Paulo, Brazil. I have not seen it and no data on the surstylus is available.



Figs. 3A-3D. *Haplopedes minutus*. 3A, Phallosome and sperm pump. 3B, Ventral view of aedeagus. 3C, Epandrium and part of hypandrium, profile. 3D, Epandrium, hypandrium, and associated structures less phallosome (sinistral half).

Figs. 4A-4E. *H. tigrensis*. 4A, Phallosome. 4B, Ventral view of aedeagus. 4C, Epandrium and part of hypandrium, profile. 4D, Epandrium, hypandrium, and associated structures (sinistral half). 4E, Sperm pump.

Haplopeodes capsici (Spencer), NEW COMBINATION

Fig. 7

Haplomyza capsici Spencer, in Spencer and Stegmaier, 1973: 175.

This species was reared from leaves of *Capsicum annum* L. in the vicinity of Tucumán, Argentina. Several larvae may feed in the same leaf and form a large communal blotch mine.

Haplopeodes eurhabdus Steyskal, NEW SPECIES

Figs. 6A–6F

Male.—Length of wing 1.3 mm. Distinguishable from *H. capsici*, as shown in the foregoing key, by little more than characters of the male postabdomen, lesser size, 6-spotted yellow abdomen (in *H. capsici* black centrally and more or less yellow laterally), 2 instead of 3 lower fronto-orbital setae (front in type specimen strongly depressed), and apparently shorter and relatively higher head (Fig. 6E). The male postabdomen (Figs. 6A–6D) is also quite similar to that of *H. capsici*, the position of the surstylar teeth, apical in *H. eurhabdus* and postapical in *H. capsici* (Fig. 7) is quite different.

Holotype.—Male, "Argentina 1972 ex *Solanum elaeagnifolium*" Cav. (H. Zimmermann), notebook no. AcSA 138B, type number 75551 in the U.S. National Museum.

The specific epithet is a Greek adjective signifying 'with a long rod.'

Haplopeodes kefi Steyskal, NEW SPECIES

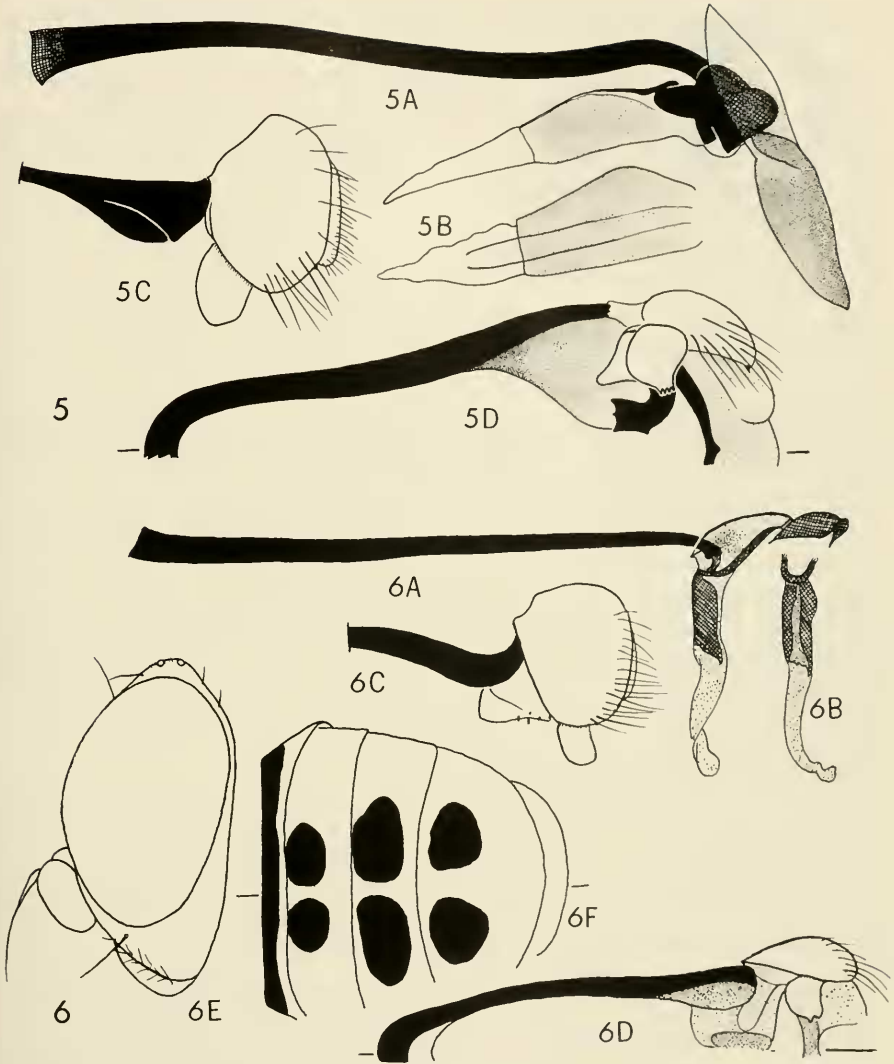
Figs. 2A–2E

Male.—Length of wing 1.08 to 1.31 mm (in type 1.21 mm). Distinguishable from *H. minutus*, as shown in the foregoing key, by little more than differences in the male postabdomen, although there seems to be a rather indistinct difference in the body coloration, the sharp differentiation between yellow margin and black center of the abdominal terga of *H. minutus* lacking, the abdomen instead being dark brownish with indistinct yellowish margins; the mesoscutum is also indistinctly yellowish before the scutellum.

Postabdomen with surstylus (Figs. 2D, 2E) placed well forward, bearing a narrow comb of 4 denticles and 2 small setae anterior to the comb; epiphallus (Fig. 2A) with dorsal profile in apical half straight, without recurved tip; aedeagus (Figs. 2A, 2B) with lightly sclerotized basal portion approximately as long as simply tapering, slender, hyaline apical portion; pregonite (Fig. 2D) with apical gash much as in *Liriomyza togata* (Fig. 1E).

Female.—Similar to male; length of wing 1.42 to 1.48 mm; ovipositor sheath short, black, about as long as yellowish last preabdominal segment.

Mine.—On dorsal surface of leaf; a highly irregular blotch seldom as much as 2 cm in greatest extent; position very variable, but most often near middle



Figs. 5A-5D. *Haplopedes vogti*. 5A, Phallosome. 5B, Ventral view of aedeagus. 5C, Epandrium and part of hypandrium, profile. 5D, Epandrium, hypandrium, and associated structures (sinistral half).

Figs. 6A-6F. *H. eurhabdus*. 6A, Phallosome. 6B, Ventral view of aedeagus. 6C, Epandrium and part of hypandrium, profile. 6D, Epandrium, hypandrium, and associated structures (sinistral half). 6E, Head of male in profile. 6F, Dorsal abdominal pattern.



7



8



9

Figs. 7 to 9. Surstylus of *Haplopeodes* spp. 7, *H. capsici*. 8, *H. lopesi*. 9, *H. philoxeri*. Redrawn from figures in original descriptions.

of leaf and usually confined to one side of midrib; feces in randomly disposed spots. At least some of the mines examined may be formed by more than one larvae, as are those described by Spencer for *H. capsici*.

Types.—Holotype, allotype, and 4 ♂ and 1 ♀ paratypes, Santa Cruz, Santa Cruz County, California, U.S.A., 14 September 1948 (K. E. Frick), ex larva *Solanum umbelliferum* Esch.; 1 pair of paratypes, same data, 17 September 1948. There are also 2 adult specimens, 5 puparia, and 7 larvae in ethanol, also 2 sheets with 66 pressed mined leaves of the host plant from this same lot (Frick no. 143-1). All is in the Frick Collection, California Academy of Sciences, San Francisco, with the exception of one pair of paratypes retained in U.S. National Museum.

The specific epithet is an acronym composed of the initial letters of the name of the collector, Kenneth E. Frick, to which -i as a genitive ending had been added.

This is the only North American species of *Haplopeodes* known to mine in a solanaceous plant, as do three South American species. The latter are much darker in color than *H. kefi* and structurally different.

Haplopeodes lopesi (Oliveira and Silva), NEW COMBINATION

Haplomyza lopesi Oliveira and Silva, 1954: 25; Spencer, 1963: 375.

Known only from the type specimens collected from *Solanum argenteum* Dunal in Rio de Janeiro, Brazil. The description is well illustrated, with some data on the larva. I have not seen the species.

Haplopeodes minutus (Frost), NEW COMBINATION

Figs. 3A-3D

Phytomyza minuta Frost, 1924: 86; Frick, 1952: 427.

Haplomyza minuta (Frost) Frick, 1953: 73 (lectotype selection); 1959: 413; 1965: 802.

Haplomyza togata (Melander) Stegmaier, 1967: 197; Spencer, 1969: 201.
Misdeterminations.

H. minuta (Frost) Spencer and Stegmaier, 1973: 112.

As shown in the above synonymy, some of the records for *Liriomyza togata* actually refer to *Haplopeodes minutus*. I have examined the postabdomen of male specimens in the type-series from Bismarck, North Dakota, 14 June 1918 and Las Cruces, New Mexico, 16 June 1917. A female from Las Cruces, 14 June 1917, and a female from Marfa, Texas, 13 June 1917, appear to be conspecific with the female from Fargo, North Dakota, 13 June 1918, that was unfortunately selected as lectotype. The preabdomen of all of these specimens is black with sharply contrasting yellow tergal margins; the first tergum is wholly yellow. The mesoscutum is black with whitish tomentum, except for yellowish lateral border and humerus, which latter includes a small dark anterior spot. The postabdomen of the male Bismarck specimen, which may be considered allotype, is shown in Fig. 3. The surstyli are borne on the middle of the lower margin of the epandrium; they bear on their apical margin a narrow two- or three-toothed comb and two moderately large setae. The epiphallus is strongly recurved apically; the aedeagus has its anterobasal portion rather strongly sclerotized and narrowed apicolaterally; the apex of the phallopodeme, at its posterior junction with the aedeagus, is hamate or turned forward to form a clawlike structure; the pregonite is carried virtually at right angles to the hypandrium and is apically bilobate.

Other specimens, including some previously referred to "*Haplomyza*" *togata*, are from the following localities: KANSAS: Manhattan, 26 August 1949 (C. Stegmaier), ex *Amaranthus retroflexus*. TEXAS: Crystal City, 26 June 1962 (J. A. Harding) reared from pigweed (*Amaranthus* sp.). WASHINGTON: Prosser, Benton County, 9 June 1952 (K. E. Frick, lot no. 52-5), ex larva, *Chenopodium album* L. CALIFORNIA: Bakersfield, Kern County, 14 August 1948 (K. E. Frick, lot no. 84-1), ex larva, *Amaranthus hybridus*; Bakersfield, 9 August 1948 (W. H. Lange), ex *Amaranthus* sp.; Mountain View, Santa Clara County, 4 July 1948 (K. E. Frick, lot no. 61-1), ex larva, *Amaranthus retroflexus*; Sunnyvale, Santa Clara County, 22 November 1948 (K. E. Frick, lot no. 171-1), ex larva, *Amaranthus retroflexus*.

Haplopeodes palliatus (Coquillett), NEW COMBINATION

Phytomyza palliata Coquillett, 1902: 191; Frost, 1924: 82.

Antineura palliata (Coquillett) Melander, 1913: 250.

Haplomyza palliata (Coquillett) Frick, 1952: 410; 1959: 413; 1965: 802.

This species, known from a single female specimen reared from *Portulaca* sp., Mesilla Park, New Mexico, 10 August (T. D. A. Cockerell), may not be a *Haplopeodes*. It is distinguished in the foregoing key.

Haplopeodes philoxeri (Spencer), NEW COMBINATION

Fig. 9

Haplomyza philoxeri Spencer, in Spencer and Stegmaier, 1973: 112.

Described from both sexes and puparium reared from *Philoxerus vermicularis* (L.) Br. (Amaranthaceae) from Monroe County, Florida. I have not seen the species.

Haplopeodes tigrensis (Spencer), NEW COMBINATION

Figs. 4A-4E

Haplomyza tigrensis Spencer, 1963: 375.

The paratype cited by Spencer as being presented to the California Academy of Sciences is a male and has been examined to secure additional detailed information and to provide the figures of the postabdomen here presented. There are four rather widely spaced denticles on the surstylus (Fig. 4D), the dorsal profile of the epiphallus (Fig. 4A) is sinuate with the tip slightly recurved, and the pregonite is longer and more slender than in other species I have examined. The aedeagus (Figs. 4A, 4B) shows a posterior lobe in the middle of the dextral side, and the ectal end of the phallopodeme is strongly bent.

The species was reared from "blotch mines on unidentified bush," Tigre, Buenos Aires, Argentina.

Haplopeodes verbascifolii (Spencer), NEW COMBINATION*Haplomyza verbascifolii* Spencer, 1963: 376.

This species is known only from the types in Spencer's collection, reared from leaf-mines on *Solanum verbascifolium* L., Agua Funda, São Paulo, Brazil. I have not seen specimens.

Haplopeodes vogti Steyskal, NEW SPECIES

Figs. 5A-5D

Male.—Length of wing 1.4 mm. Distinguishable from *H. minutus* and *H. kefi*, as shown in the foregoing key, by little more than differences in the male postabdomen. Cheek deep posteriorly, 0.4 as deep as vertical diameter of eye; abdominal dorsum blackish, becoming brown to yellowish laterally and apically.

Postabdomen with surstylus (Figs. 5C, 5D) placed well forward on epandrium, bearing comb of 4 closely spaced, minute denticles on a short projection and without seta; epiphallus (Fig. 5A) without recurved tip; aedeagus (Figs. 5A, 5B) with basal portion lightly sclerotized, swollen at basal $\frac{1}{3}$ on sinistral side, apical portion a little shorter than basal portion and simply tapering to pointed tip; basal expansion of hypandrial arms (Fig. 5D) broad and lacking seta.

Female.—Similar to male; length of wing 1.7 mm; last preabdominal tergum yellowish with pair of median brown spots; ovipositor sheath blackish, about as long as last preabdominal tergum.

Types.—Holotype, ♂, and allotype, Brazil: Tramandaí, Rio Grande do Sul, 2 February 1961, ex leaf-mine in *Phloxerus portulacoides* St. Hil. (G. Vogt), type no. 75553 in the U.S. National Museum.

The specific epithet is a genitive patronymic in recognition of colleague George Vogt's accomplishments in entomology.

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